October 31, 2002

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Center For Nuclear Waste Regulatory Analyses
6220 Culebra Road P.O. Drawer 28510
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Subject: Repository Design and Thermal-Mechanical Effects Key Technical Issue Intermediate milestone No.20-01402.672.210: Preclosure Safety Assessment Tool Development and Verification–Progress Report

Dear Dr. Chowdhury,

We have reviewed the Center's Report entitled: "Preclosure Safety Assessment (PCSA) Tool Development Progress Report-II," dated September 26, 2002. The progress report covers Center's work for FY 2002 on the development of PCSA Tool. The U.S. Nuclear Regulatory Commission (NRC) staff had provided comments on the earlier versions of this report. Most of the staff comments provided on the earlier version have been addressed in this report. NRC staff, David Dancer and Seung Lee, spent a week at the Center to get familiar with the PCSA Tool and provided suggestions for improvement. The staff continues to exercise the latest version of the Tool and may provide additional comments as they are developed. The following comments are generated based on the review of the subject Progress Report-II and should be considered in the future revisions.

General Comments

1. The PCSA Tool needs to be closely linked to the Yucca Mountain Review Plan (YMRP) by explicitly citing acceptance criteria and review methods in appropriate sections of the PCSA report. The purpose of the PCSA tool is to assist the staff in verifying that the U.S. Department of Energy (DOE) has demonstrated compliance with the YMRP acceptance criteria, primarily through implementing the review methods. Concurrently, the PCSA Tool should also be used to verify that the cited review methods and acceptance criteria will provide an adequate basis for making a licensing decision.

2. Future revision should expand the failure frequency data base to include "wheeled transporter system" that DOE is proposing to use in handling the waste containers.

3. Future revision should use the latest version of RSAC code.

4. The Tool should have the capability to include codes used by DOE in their preclosure safety analysis. For example, DOE is planning to use MACCS2 code for consequence calculation.

Detailed Comments And Clarifying Questions

1. Section 1.3, page 1-6, seventh line from the bottom of the section, the sentence is incomplete, there may be a missing line.

2. Section 1.4, page 1-7, paragraph 2, add a sentence on Chapter 3 on site information. Also, hazards information is presented in Chapter 4 of this report and not in chapter 3 as stated.

3. In Fig. 6-11, the frequencies for CTS-1-01, CTS-1-02, and CTS-1-03 are 2.697e-2, 2.862e-5, and 1.374e-8, respectively. However, based on the given data, should they be 2.7171e-2 (2.72e-2 x (1-1.06e-3)), 2.8818e-5 (2.72e-2 x 1.06e-3 (1-4.8e-4)), and 1.3839e-8 (2.72e-2 x 1.06e-3 x 4.8e-4), respectively? Are these numbers calculated by Saphire, or manually?

4. On Page 6-5, the acronym for Integrated Reliability and Risk Analysis System Assessment should be IRRAS and not IRAS; check this.

5. Page 7-1, Section 7.1.1.1 The text should include the following statement: "The RSAC Code and Users Manual can also be downloaded from http://www.inel.gov/rsac/default.asp."

6. Page 7-33, Section 7.1.4 The text should include the following statement: "The maximum number of realizations is 1000. This limitation is a RSAC code limitation, but the RSAC code can be modified to accommodate a greater number of realizations." Future revisions of the tool should increase the maximum allowable realizations in RSAC code from 1000 to perhaps 10,000.

7. Pages 7-33 and 7-34, Section 7.1.4, the statement that the tool reverts to Monte Carlo sampling for small number of realizations, may not be accurate. State the minimum number of realizations needed for Latin Hypercube Sampling.

8. On Page 7-35, in the first paragraph of Section 7.2.3, it is said that "If the pool release fraction for tritium and iodine is much less than one, the inhalation dose could be overestimated by as much as a factor of three." Check this statement. It should be “underestimated” because the airborne concentration is proportional to release factor.

9. Page 8-1, section 8.1.1.1, the last sentence should be revised as follows: In addition to the two safety assessment approaches, the sum of the doses from normal operations and the conditional dose (not frequency weighted) from each combination of Category 1 event sequences expected to occur at least once in the preclosure period must be compared to the annual dose limit specified in 10 CFR 63.204.

10. Page 8-4, section 8.1.1.3, the phrase "annual doses for routine releases" should be revised to "annual doses from normal operations."

11. Page 10-9, last paragraph, the compliance dose for category 1 event sequence from final Part 63 (15 mrems/yr) should be cited.

Editorial Comments

There are many conversion errors.

1. In Section 7.1.1.2.1, 5.45 x 10^{-7} Sv/Bq is 2.02 x 10^{6} rem/Ci, not 2.02 x 10^{-6} rem/Ci.
2. On Page 7-28, 3,300 m is not 1,800 ft, and 3,000 m is not 980 ft.

There are many typos.

1. In Section 3.2.3, Table 3-1 was cited. Should it be Table 4-1?
2. In Section 3.3.1.1, Figure 3-3 was cited. Figure 3-3 does not have Project Tree. Delete reference to the figure.
3. In Section 7.1.1.2.3, Table 8-1 was cited. There is no Table 8-1.
4. In Section 8.1.1.2, the dimension of "rem per year-^{1}" should read "rem per year."

Banad Jagannath, Dennis Galvin, Seung Lee and Dave Dancer contributed to developing the above comments. If there are additional comments and/or recommendations for future work by other staff reviewers on this report, I will forward them to you as and when they become available. If you have any questions on the contents of this letter, please contact me by phone at (301) 415-6695 or via e-mail at <msn1@nrc.gov>. No written response to this letter is required and the Center's contractual obligations for this Intermediate Milestone are considered to have been met.

Sincerely.

/RA/

Mysore Nataraja, Program Element Manager
Division of Waste Management
Office of Nuclear Materials Safety
and Safeguards

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